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EXAMINER

SONG, MATTHEW J

ART UNIT PAPER NUMBER

1765

DATE MAILED: 04/07/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/728,193

Applicant(s)

MORITA, ETSUO

Examiner

Matthew J Song

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 15 January 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,2,4-20 and 23-26 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,4-20 and 23-26 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 112*

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claim 25 and 26 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 25 recites, "a second plurality of patterns overlies a pattern element of said first plurality of patterns in the direction of the thickness of the crystal and at least one pattern element of said second plurality of patterns does not overlie a pattern element of said first plurality of patterns in the direction of thickness of the crystal". The instant specification merely teaches partly overlies the first pattern, note pages 4-6 of the instant specification and Figures 2-

3. There is no support for "at least one pattern element of said second plurality of patterns does not overlie a pattern element of said first plurality of patterns in the direction of thickness of the crystal"

3. Claim 25 and 26 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant

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art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 25 recites, "a second plurality of patterns overlies a pattern element of said first plurality of patterns in the direction of the thickness of the crystal and at least one pattern element of said second plurality of patterns **does not** overlie a pattern element of said first plurality of patterns in the direction of thickness of the crystal". The instant specification does not provide an explicit teaching of excluding a pattern form overlying a pattern element of the first plurality of patterns. Any negative limitation or exclusionary proviso must have basis in the original disclosure (MPEP 2173.05 (i)).

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 25-26 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 25 recites, "a second plurality of patterns overlies a pattern element of said first plurality of patterns" in line 11-12 and "at least one pattern element of said second plurality of patterns does not overlie a pattern element of said first plurality of patterns" in lines 13-14. It is unclear if

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1,2, 4, 7, 11-20 and 23-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pribat et al (US 4,952,526).

Pribat et al discloses a wafer **1** made of GaAs or InP (claim 14), this reads on applicant's basal body, depositing a dielectric thin layer **2** of silicon nitride or silica (claim 12-13), where excellent deposition selectivity can be obtained between GaAs and a silicon nitride film by plasma assisted CVD (claim 16-17) (col 10, ln 1-35) with a thickness between  $5 \times 10^{-2}$  and a few micrometers, etching a set of bands **23,24** (claim 2 and 7) on the dielectric using means known to those skilled in the art such as photolithography or wet or dry chemical attack (col 4, ln 50-60), where the bands **23,24** have a width of 0.5 to a few microns and being spaced out at distances of some microns to several hundred microns, thus periodically baring the substrate (col 10, ln 50-67 and col 11, ln 1-10 and Figs 23-24). Pribat et al also discloses a deposition of a thin film of III-V compound is deposited on the preceding structure by MOCVD, with a thickness of a few hundred angstroms to a few microns and depositing a second layer of dielectric, with a thickness of a few hundred angstroms to a few micrometers (col 11, ln 11-38 and Fig 26). Pribat et al also discloses apertures are etched in a second layer of the dielectric and the apertures are offset with respect to the previous ones and the offset can vary from some micrometers to some hundreds of micrometers, this reads on applicant's forming patterns at least partly overlies one another and at least partly do not overlies one another. Pribat et al also discloses III-V polycrystalline material is removed by chemical attack through the apertures, this reads on applicant's forming an

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indentation (claim 16-19) so as to bare the monocrystalline seed through the apertures and growing a thin layer of monocrystalline III-V material between the dielectric layers and the upper dielectric is removed throughout the surface of the wafer so as to obtain a monocrystalline thin layer of semiconductor (claim 17) (col 11, ln 39-67 and Fig 27). Pribat et al also discloses repeating the disclosed method to obtain a stacking shown in Fig 14 (claims 16-19) (col 12, ln 1-25 and Figs 22-31). Pribat et al discloses a base layer **32** in Fig 31 (claims 11 and 16-19). Pribat et al also discloses a first pattern of dielectric material **50** and **51** with different lengths than a second pattern of dielectric material **20** and **21** in Fig 19.

Pribat et al does not teach the pitch of pattern elements of one of the plurality of patterns and pitch of pattern elements of another of the plurality of patterns are different from each other.

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Pribat et al to obtain a different pitch between pattern elements of one and another pattern element by optimizing the pitch of each pattern element by conducting routine experiments of a result effective variable as recognized by the art.

Referring to claim 4, Pribat et al teaches optimizing the pitch of each pattern element, this inherently would satisfy the relationship of claim 4.

8. Claims 1,2, 4, 7, 11-15 and 23-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsuda et al (US 6,294,440).

Tsuda et al discloses a GaN layer **101**, this reads on applicant's base layer, is grown to a thickness of about 4 micrometers on a sapphire substrate **100** (claim 14) is placed in a growth chamber and a first patterned mask made of SiO<sub>2</sub> (claim 12-13) is formed on the GaN layer **101**

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by sputtering (claim 15) and the SiO<sub>2</sub> film is patterned to a periodic strip with a width of about 7 micrometers and a pitch of about 10 micrometers by conventional photolithography method, whereby a first SiO<sub>2</sub> mask **102** is formed (col 7, ln 20-45). Tsuda et al also discloses a GaN crystal film **103** is grown by Metal organic vapor phase epitaxy (MOVPE) to a thickness of about 3 micrometers and a forming a second mask on the GaN film **103**. Tsuda et al also discloses the second mask film **104** is a SiO<sub>2</sub> film with a thickness of about 200 nm with a periodic strip pattern (claim 2 and 7) with a width of about 8 micrometers and a pitch of about 10 micrometers is formed by a photolithography method and forming a GaN single crystal film **105** thereon by MOVPE (col 7, ln 46-67 and col 8, ln 1-30 and Fig 1). Tsuda et al also discloses it is important to select a relationship between the size of each opening of the first mask and the stripe width of the second mask, depending upon required characteristics of a light-emitting device, this reads on applicant's pitch of pattern elements (col 8, ln 31-65). Tsuda et al also discloses a semiconductor substrate including a sapphire substrate can also be used as a substrate, where a sapphire substrate may be peeled off from a semiconductor structure by grinding or etching and the remaining structure can be used as a substrate (claims 20 and 24) (col 22, ln 2-60).

Tsuda et al discloses it is important to select a relationship between the size of each opening of the first mask (claim 6) and the stripe width of the second mask, depending upon required characteristics of a light-emitting device, this reads on applicant's pitch of pattern elements (col 8, ln 31-65). Tsuda et al does not disclose the pitch of pattern elements of one of the plurality of patterns and pitch of pattern elements of another of the plurality of patterns are different from each other.

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It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Tsuda et al to obtain a different pitch between pattern elements of one and another pattern element by optimizing the pitch of each pattern element by conducting routine experiments of a result effective variable as recognized by the art.

Referring to claim 4, Tsuda et al teaches optimizing the pitch of each pattern element, this inherently would satisfy the relationship of claim 4.

Referring to claim 11, Tsuda et al discloses a method of forming layer **101**, the examiner interprets this to read on applicant's predetermined base layer, a first pattern formation **102**, a first growth step **103**, second pattern **104** and second growth step **105**.

Referring to claims 25-26, Tsuda et al is silent to at least one pattern element of the second plurality of patterns does not overlie a pattern element of the first plurality of patterns. Optimizing the pitch of elements in Tsuda to obtain a desired characteristic of the light emitting device is expected to result in at least one element not overlying an element in the first pattern based on the micrometer size of the pattern elements and the overall size of the device is typically in millimeters resulting in thousands of pattern elements.

9. Claims 1, 4-6, and 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pribat et al (US 4,952,526) or Tsuda et al (US 6,294,440) in view of Fleming et al (US 6,358,854).

Pribat et al or Tsuda et al teaches all of the limitations of claim 1, as discussed previously above, except the pitch of pattern elements of one of the plurality of patterns and pitch of pattern elements of another of the plurality of patterns are different from each other.



In a method of layered material compositions, Fleming et al teaches a first structured layer **204** comprises a planar pattern of spacer bars **202** of a first material, silica, and rods **205**, of a second material, polysilicon, (col 7, ln 1-67) and the first and second material can be selected from III-V semiconductors (col 8, ln 60-67 and col 9, ln 1-20) and features which make a structured layer need not be rectangular bars arranged parallel to each other, but can take on nearly any shape, size (claim 6) and orientation and the size, spacing and separation of elements, this reads on applicant's pitch, making up the structured layers can also vary between layers (col 10, ln 1-30 and col 11, ln 1-10). Fleming et al also discloses a first layer includes a continuous hexagonal distribution of first material, this reads on applicant's two directions (claim 8), the voids of the array being filled with a second material (col 11, ln 11-30 and Fig 6) and a conventional two-dimensional photonic lattice is implemented with a single structural layer (claim 8), the two-dimensional structure within that layer giving the desired optical properties. (col 12, ln 1-35). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Pribat et al or Tsuda et al with Fleming's varying pitch between layers to change the optical properties.

### ***Response to Arguments***

10. Applicant's arguments with respect to claims 1, 2, 4-20 and 23-26 have been considered but are moot in view of the new ground(s) of rejection.

11. Applicant's arguments filed 1/15/2004 have been fully considered but they are not persuasive.

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Applicants' argument that there is no motivation or suggestion to modify Pribat to use a plurality of patterns is noted but is not found persuasive. Pribat teaches apertures are made in the form of bands with a width of 1 to 20 micrometers and insulator bands having a width of 20 to 100 micrometers (col 5, ln 55-68). Pribat also teaches the size of the apertures affects the thickness of a monocrystalline silicon layer deposited within the apertures (col 7, ln 45 to col 8, ln 5). Pribat teaches various size of apertures and bands and that the size of the apertures affects the thickness of the a monocrystalline silicon layer, which suggests the aperture size is a result effective variable, which can be optimized through routine experimentation. Therefore, because the width of the each gap 43,44,45 can be optimized to produce a uniformly thick monocrystalline silicon layer; the pitch will be different because the pitch is dependent on the width of a stripe and the width of the interval of a stripe, note page 9 of the instant specification. Furthermore, Pribat teaches different lengths of dielectric and different spacing amounts in Figure 19 and the two patterns appear to have a different pitch because of these difference in dielectric length and spacing. It is also noted that the sole difference between Pribat and the instant invention is the difference in pitch, which is merely a change in the size of the gaps and the size of the stripes. Changes in size and shape are held to be obvious (MPEP 2144.04).

Applicants' argument that Pribat teaches away from using different pitches is noted but is not found persuasive. Applicants' allege that the apertures are disposed above the bands to grow monocrystalline silicon; therefore Pribat teaches away from using different pitches. Pribat does teach the apertures are above the bands to produce monocrystalline silicon, as suggested by applicant. However, different pitches can be used, which still allow access to the lower level of bands. Pribat merely requires an aperture over a dielectric layer. Pribat does not require the pitch

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to be the same, as suggested by applicants; therefore does not teach away from using different pitches.

Applicants' argument against the combination of Pribat and Fleming is noted but is not found persuasive. Applicants' allege that Fleming does suggest the pitch of two patterns is different from each other. Fleming teaches the shape, size and orientation of a plurality of a patterns in a structured layer need not be rectangular bars. Changing the size, shape and orientation of the elements of a patterned layer is well known in the art, as evidenced by Fleming. These changes in the size of the bars will inherently change the pitch of a layer because the pitch is dependent on the width of stripe and width of the interval between stripes. Therefore, Fleming does suggest changing the pitch of a patterns.

### *Conclusion*

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Gardner et al (US 6,051,876) teaches a plurality of patterns 152 having different spacing and sizes, which reads on applicants' different pitch, in Figures 1B and 1C

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO**

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MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J Song whose telephone number is 571-272-1468. The examiner can normally be reached on M-F 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Matthew J Song  
Examiner  
Art Unit 1765

MJS

**NADINE G. NORTON**  
**SUPERVISORY PATENT EXAMINER**

